Fact Sheet

**The U.S. Environmental Protection Agency (EPA)
Proposes to Reissue a National Pollutant Discharge Elimination System (NPDES) Permit to Discharge Pollutants Pursuant to the Provisions of the Clean Water Act (CWA) to:**

**Darigold Inc.
520 Albany Street
Caldwell, Idaho 83606**

Public Comment Start Date: August 28, 2018
Public Comment Expiration Date: September 27, 2018

Technical Contact: John Drabek, PE
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The EPA Proposes To Reissue NPDES Permit
The EPA proposes to reissue the NPDES permit for the facility referenced above. The draft permit places conditions on the discharge of pollutants from the wastewater treatment plant to waters of the United States. In order to ensure protection of water quality and human health, the permit places limits on the types and amounts of pollutants that can be discharged from the facility.

This Fact Sheet includes:
- information on public comment, public hearing, and appeal procedures
- a listing of proposed effluent limitations and other conditions for the facility
- a map and description of the discharge location
- technical material supporting the conditions in the permit

State Certification
Upon the EPA's request, the Idaho Department of Environmental Quality (IDEQ) has provided a draft certification of the permit for this facility under Section 401 of the Clean Water Act. Comments regarding the certification should be directed to:

Idaho Department of Environmental Quality
Boise Regional Office
Attn: Surface Water Manager
1445 N. Orchard St.
Boise, Idaho 83706

Public Comment
Persons wishing to comment on, or request a Public Hearing for the draft permit for this facility may do so in writing by the expiration date of the Public Comment period. A request for a Public Hearing must state the nature of the issues to be raised as well as the requester's name, address and telephone number. All comments and requests for Public Hearings must be in writing and should be submitted to the EPA as described in the Public Comments Section of the attached Public Notice.

After the Public Notice expires, and all comments have been considered, the EPA's regional Director for the Office of Water and Watersheds will make a final decision regarding permit issuance. If no substantive comments are received, the tentative conditions in the draft permit will become final, and the permit will become effective upon issuance. If substantive comments are received, the EPA will address the comments and issue the permit. The permit will become effective no less than 30 days after the issuance date, unless an appeal is submitted to the Environmental Appeals Board within 30 days pursuant to 40 CFR 124.19.

Documents are Available for Review
The draft NPDES permit and related documents can be reviewed or obtained by visiting or contacting the EPA's Regional Office in Seattle between 8:30 a.m. and 4:00 p.m., Monday through Friday at the address below. The draft permits, fact sheet, and other information can also be found by visiting the Region 10 NPDES website at https://www.epa.gov/npdes-permits/about-region-10s-npdes-permit-program.
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US EPA Region 10
1200 Sixth Avenue
Suite 155,
Seattle, Washington 98101
(206) 553-0523 or
Toll Free 1-800-424-4372 (within Alaska, Idaho, Oregon, and Washington)

The fact sheet and draft permits are also available at:

EPA Idaho Operations Office
950 W Bannock Suite 900
Boise, ID 83702
Phone: 208-378-5746

Idaho Department of Environmental Quality
Boise Regional Office
1445 N. Orchard St.
Boise, Idaho 83706
Phone: 208-373-0550, toll-free 888-800-3480

Acronyms

1Q10	1 day, 10 year low flow
7Q10	7 day, 10 year low flow
30Q5	30 day, 5 year low flow
AML	Average monthly limit
BOD_5	Biochemical oxygen demand, five-day
CFR	Code of Federal Regulations
cfs	cubic feet per second
COW	Condensate of whey
CV	Coefficient of variation
CWA	Clean Water Act
DMR	Discharge monitoring report
EFH	Essential fish habitat
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
HUC	Hydrologic unit code
IDEQ	Idaho Department of Environmental Quality
IPDES	Idaho Pollutant Discharge Elimination System
LA	Load allocation
MDL	Maximum daily limit
mgd	million gallons per day
MOEC	Maximum observed effluent concentration
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NWIS	National Water Information System
QAP	Quality assurance plan
RPA	Reasonable potential analysis
RPMF	Reasonable potential multiplying factor
SIC	Standard industrial classification
TBEL	Technology-based effluent limits
TMDL	Total maximum daily load
TSD	Technical Support Document for Water Quality-based Toxics Control

	(EPA/505/2-90-001)
TSS	Total suspended solids
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
WLA	Wasteload allocation
WQBEL	Water quality-based effluent limit
WQC	Water quality criterion
WQS	Water quality standards
WWTP	Wastewater treatment plant

I. Background Information

A. General Information

This fact sheet provides information on the draft NPDES permit for the following entity:

Darigold Inc.
NPDES Permit No. ID0024953

Physical Address:
520 Albany Street
Caldwell, Idaho 83605

Mailing Address:
520 Albany Street
Caldwell, Idaho 83605

Contact:
Scott Algate
Senior EHS Manager
scott.algate@darigold.com
208.420.1193

B. Permit History

The most recent NPDES permit for Darigold Inc. was issued on September 30, 1999, became effective on November 2, 1999, and expired on November 2, 2004. An NPDES application for permit issuance was submitted by the permittee on February 17, 2004. The EPA determined that the application was timely and complete. Therefore, pursuant to 40 CFR 122.6, the permit has been administratively extended and remains fully effective and enforceable.

II. Idaho NPDES Authorization

In 2014, the Idaho Legislature revised the Idaho Code to direct the Idaho Department of Environmental Quality (IDEQ) to seek authorization from the EPA to administer the NPDES permit program for the State of Idaho. On August 31, 2016, IDEQ submitted a program package pursuant to CWA Section 402(b) and 40 CFR 123.21.

IDEQ's IPDES program was approved by EPA on June 5, 2018. Authority over non-POTW permits will transfer to IDEQ on July 1, 2019. After that time, all documentation required by the permit must be sent to IDEQ rather than to EPA and any decision under the permit stated to be made by EPA or jointly between EPA and IDEQ will be made solely by IDEQ. Permittees will be notified by IDEQ prior to this transition. Information about the IPDES program is available at https://www.epa.gov/npdes-permits/idaho-npdes-program-authorization.

III. Facility Information

A. Facility Description

The Darigold Inc. facility (Darigold), located in Caldwell, Idaho, is a milk processing plant that receives and processes whole milk into non-fat dry milk and cream (Standard Industrial Classification [SIC] code 2023). The plant also processes butter (SIC code 2021). Darigold is a processing subsidiary of Northwest Dairy Association. Darigold processes 3.3 million pounds of milk per day. Darigold discharges 300,000 gallons per day (gpd) of evaporated condensate of whey ("COW" water) from its drying process through the facility's outfall. The facility uses single pass cooling water from municipal potable water well systems. The non-contact cooling water is used in the ammonia compressors, cream silo jackets, and cooling towers. The non-contact cooling water, totaling 80,000 gpd, is discharged to the City of Caldwell wastewater treatment plant (WWTP) when the non-contact cooling water effluent does not meet the temperature, turbidity or pH effluent limits in Darigold's existing permit. No water is discharged from the butter process. Therefore, Darigold's total discharge is 0.38 million gallons per day (mgd).

Outfall Description

Darigold discharges continuously through Outfall 001 to the Lower Boise River. The discharge is through an open pipe.

B. Background Information

Effluent Characterization

To characterize the effluent, the EPA evaluated the facility's application form, discharge monitoring report (DMR) data, the updated application, and additional sampling data provided by Darigold. Findings are summarized in Table 1 below.

Table 1 Effluent Characterization

Parameter	Maximum	Minimum	Notes
BOD, 5-day, 20°C, mg/L	15	4	DMRs
Flow, in conduit or thru treatment plant, mgd	0.42	0.21	DMRs
Nitrogen, ammonia total [as N], µg/L	4.86	0.64	DMRs, COW water raw data (2012-2017)
pH, standard units	9.3	6.6	DMRs
Solids, total suspended, mg/L	13	3	DMRs
Temperature, water °C	21.5	13.2	DMRs

Compliance History

The facility has a good compliance history with no violations in the past five years of DMR data. The last inspection report of July 24, 2017 found no concerns.

Additional compliance information for this facility, including compliance with other environmental statutes, is available on Enforcement and Compliance History Online (ECHO). The ECHO web address for this facility https://echo.epa.gov/detailed-facility-report?fid=110000468556.

IV. Receiving Water

In drafting permit conditions, the EPA must analyze the effect of the facility's discharge on the receiving water. The details of that analysis are provided later in this Fact Sheet. This section summarizes characteristics of the receiving water body that impact that analysis.

A. Designated Beneficial Uses

This facility discharges to the Boise River in the City of Caldwell, Idaho, located in the Lower Boise Watershed (HUC 17050114), River Mile 50 to Indian Creek. The outfall is located upstream of the confluence with Indian Creek.

This segment of the Lower Boise River is designated for cold water aquatic life, salmonid spawning, and primary contact recreation. In addition, water quality standards (WQS) state that all waters of the State of Idaho are protected for industrial and agricultural water supply, wildlife habitats, and aesthetics (IDAPA 58.01.02.100.03.b and c, 100.04 and 100.05).

The permit must include any effluent limitations necessary to meet the water quality standards. See Part V below.

B. Water Quality

The water quality for the receiving water is summarized below.

Table 2 Receiving Water Quality

Parameter	Units	Percentile	Value	Source
Temperature	°C	95th	20.95	USGS Station[1]
pH	Standard units	95th	8.4	NPDES Permit #ID0021504 City of Caldwell WWTP (2015)
Ammonia	mg/L	maximum	0.08	NPDES Permit #ID0021504 City of Caldwell WWTP (2015)
Source: [1]USGS Station 13211205,				

C. Water Quality Limited Waters

Any waterbody for which the water quality does not meet applicable WQS is defined as a "water quality limited segment."

Section 303(d) of the CWA requires states to develop a total maximum daily load (TMDL) management plan for water bodies determined to be water quality limited segments. A TMDL is a detailed analysis of the water body to determine its assimilative capacity. The assimilative capacity is the loading of a pollutant that a water body can assimilate without causing or contributing to a violation of WQS. Once the assimilative capacity of the water

body has been determined, the TMDL will allocate that capacity among point and non-point pollutant sources, taking into account natural background levels and a margin of safety. Allocations for non-point sources are known as load allocations (LAs). The allocations for point sources, known as waste load allocations (WLAs), are implemented through effluent limitations in NPDES permits. Effluent limitations for point sources must be consistent with the assumptions and requirements of any available WLA.

This facility discharges into the Lower Boise River. The Lower Boise River flows into the Snake River. The Lower Boise River is impaired for bacteria, *E. coli*, sediment, and temperature according to IDEQ's 2014 Integrated Report Section 3 (section 303(d)).

The *Sediment and Bacteria Allocations Addendum to the Lower Boise River TMDL* (TSS and *E. Coli* Addendum) was approved by the EPA in June 2008. The *Lower Boise River TMDL 2015 Sediment and Bacteria Addendum*, was approved by the EPA on September 18, 2015 (2015 Addendum). The TSS and *E. coli* Addendum in Table 15 provided a TSS reserve for growth allocation. In a letter dated September 7, 2017, IDEQ stated that IDEQ is revising the TSS and *E. Coli* Addendum Table 15 to provide Darigold with a TSS WLA of "100 lbs/day and 143 lbs/day for the monthly average and weekly average limits, respectively." As set forth in the EPA's "Permitting to Meet a Total Maximum Daily Load (TMDL)" guidance, a permit writer should implement mass-based WLAs as mass-based water quality based effluent limits (WQBELs) to ensure that the WQBELs are consistent with the assumptions of the WLA. See 40 CFR 122.44(d)(1)(vii)(B). Therefore, the draft permit applies these WLAs as mass-based limits.

Bacteria WLAs in the TMDL are set at geometric mean criteria for *E. coli* bacteria to ensure recreational uses are supported as stated on page 46:

> "The *E. coli* wasteload allocations are based on a bacteria concentration of 126 cfu/100 mL, collected as a 5-sample geometric mean over 30 days."

This is the effluent limit for *E. coli* established in the draft permit and is therefore consistent with the requirements and assumptions of the 2015 Addendum as required in 40 CFR 122.44(d)(1)(vii)(B).

The *Lower Boise River TMDL 2015 Total Phosphorus Addendum* (Phosphorus Addendum), was approved by the EPA in December 2015. Table 27 provides a total phosphorus WLA to Darigold of 1.4 lbs/day as a monthly average from May 1 through September 30. To ensure that the permit effluent limit is consistent with the WLA in the TMDL, the permit establishes a monthly average effluent limitation of 1.4 lbs/day.

The Phosphorus Addendum also provides a total phosphorus WLA of 5.0 lbs/day as a monthly average from October 1 through April 30 in Table 34. Therefore, to ensure that the permit effluent limit is consistent with the WLA in the TMDL, the permit establishes a monthly average loading limit of 5.0 lbs/day during these months.

IDEQ has not developed a temperature TMDL to address the impairment in the Lower Boise River.

D. Low Flow Conditions

The low flow conditions of a water body are used to determine WQBELs. In general, Idaho's WQS require criteria be evaluated at the following low flow receiving water conditions (see IDAPA 58.01.02.210.03):

Table 3 – Critical Low Flows

Acute aquatic life	1Q10 or 1B3
Chronic aquatic life	7Q10 or 4B3
Non-carcinogenic human health criteria	30Q5
Carcinogenic human health criteria	Harmonic mean
Ammonia	30Q10, 30Q5, 30B3, 1Q10

The nearest U.S. Geological Survey (USGS) gage is site number 434049116414000, BOISE RIVER NR CALDWELL NR PIEZO 7-RB. However, there were not enough flow data to directly calculate the critical low flows. Therefore, the EPA estimated critical low flows of the Boise River downstream of the discharge from USGS gage 13211205, BOISE RIVER AT CALDWELL, ID. There are no diversions or other dischargers between Darigold and this stream gage. These 565 data points were retrieved from the USGS National Water Information System (NWIS) and cover daily flows from November 2015 to the present.

First, provisional data were eliminated from the data set. These are data points that have not yet been verified by USGS. The harmonic mean was calculated using available data for use in estimating the 7Q10 and 1Q10.

The 7Q10 flows were then estimated from the harmonic and arithmetic mean flows. According to EPA's *Technical Support Document for Water Quality-based Toxics Control* (TSD) (page 89), the harmonic mean flow (Q_{hm}) can be estimated from a known 7Q10 and arithmetic mean (Q_{am}) using the following equation:

$$Q_{hm} = [1.194 \times (Q_{am})^{0.473}] \times [(7Q10)^{0.552}]$$

Equation 1 – Harmonic mean flow calculation

This equation can be solved for the 7Q10 as follows:

$$7Q10 = \left(\frac{Q_{hm}}{1.194 \times {Q_{am}}^{0.473}}\right)^{1/0.552}$$

Equation 2 – 7Q10 calculation

The TSD states that "in the comparisons of flows for smaller rivers (i.e., low flow of 50 cfs), the 30Q5 flow was, on the average, only 1.1 times that of the 7Q10. For larger river (i.e., low flow of 600 cfs), the factor was, on the average, 1.4 times." The chapter on "Stream Design Flow for Steady-State Modeling" from the *Technical Guidance Manual for Performing Wasteload Allocation: Book VI* (EPA 1986) states that the average ratio of the 7Q10 to the 1Q10 is 1.3:1.

Thus, the 1Q10 and 30Q5 can be estimated from the 7Q10 as follows:

$$1Q10 = \frac{7Q10}{1.3}$$ **Equation 3 – 1Q10 calculation**

$$30Q5 = 7Q10 \times 1.4$$ **Equation 4 – 30Q5 calculation**

Table 4 Annual Critical Low Flows for the Boise River at Darigold

1Q10 (cfs)	7Q10 (cfs)	30Q5 (cfs)
128	167	234

E. Water Quality Standards

Section 301(b)(1)(C) of the CWA requires the development of limitations in permits necessary to meet WQS. Federal regulations at 40 CFR 122.4(d) require that the conditions in NPDES permits ensure compliance with the WQS of all affected States. A State's WQS are composed of use classifications, numeric and/or narrative water quality criteria (WQC) and an anti-degradation policy.

The use classification system designates the beneficial uses that each water body is expected to achieve, such as drinking water supply, contact recreation, and aquatic life. The numeric and narrative WQC are the criteria deemed necessary to support the beneficial use classification of each water body. The anti-degradation policy represents a three-tiered approach to maintain and protect various levels of water quality and uses. IDAPA 58.01.02.140.12 protects this portion of the Boise River for primary contact recreation, domestic and agricultural water supply, cold water aquatic life, and salmonid spawning.

V. Effluent Limitations and Monitoring

Table 5 presents the existing effluent limits and monitoring requirements in the Darigold Permit. Table 6 presents the proposed effluent limits and monitoring requirements in the draft permit with new effluent limitations in bold text.

Table 5. Existing Effluent Limits and Monitoring Requirements

Parameter	Units	Effluent Limitations			Monitoring Requirements		
		Average Monthly	Instantaneous Max	Maximum Daily	Sample Location	Sample Frequency	Sample Type
Parameters With Effluent Limits							
Temperature	ºC	---	22	19	Effluent	Continuous	Record
Flow	mgd	---	---	1.7	Effluent	Continuous	Record
Total Ammonia as N	mg/L	--	--	--	Effluent	1/week	24-hour composite

Parameter	Units	Effluent Limitations			Monitoring Requirements		
		Average Monthly	Instantaneous Max	Maximum Daily	Sample Location	Sample Frequency	Sample Type
Biochemical Oxygen Demand (BOD_5)[2]	mg/L	30	--	--	Effluent	1/week	24-hour composite
Total Suspended Solids (TSS)	mg/L	30	--	--	Effluent	1/week	24-hour composite

Table 6 Proposed Effluent Limits and Monitoring Requirements

Parameter	Units	Effluent Limitations					Monitoring Requirements		
		Average Monthly	Average Weekly	Instantaneous Max	Maximum Daily	Maximum Weekly	Sample Location	Sample Frequency	Sample Type
Parameters With Effluent Limits									
Biochemical Oxygen Demand (BOD_5)	mg/L	30	--	--	--	--	Effluent	1/week	24-hour composite
	lb/day[1]	**55**	**--**	**--**	**109**	**--**			
Total Suspended Solids (TSS)	mg/L	30		--	--	--	Effluent	1/week	24-hour composite
	lb/day[1]	**100**	**143**	**--**	**--**	**--**			
E. coli **[2]**	**CFU/ 100 ml**	**126**	**--**	**406**	**--**	**--**	Effluent	5/month	Grab
Temperature June 1 – October 31	**ºC**	**--**	**--**	**22[3]**	**19**	**--**	Effluent	Continuous	Recording
Temperature November 1 – May 31	**ºC**	**--**	**--**	**--**	**--**	**13[4]**	Effluent	Continuous	Recording
Phosphorous (May 1 – September 30)	**mg/L**	**--**	**--**	**--**	**--**	**--**	Effluent	1/week	Grab
	lb/day	**1.4**	**--**	**--**	**2.1**	**--**			
Phosphorous (October 1 – April 30)	**mg/L**	**--**	**--**	**--**	**--**	**--**	Effluent	1/week	Grab
	lb/day	**5.0**	**--**	**--**	**7.5**	**--**			
pH	**std units**	**6.5 – 9.0[3]**					Effluent	Continuous	Grab or Meter
Report Parameters									
Flow	mgd	Report	--	--	Report	--	Effluent	Continuous	Meter
Ammonia	mg/L	Report	--	--	Report	--	Effluent	1/month	Grab
Iron, Total	**mg/L**	**Report**	**--**	**--**	**Report**	**--**	**Effluent**	**1/quarter**	**Grab**
Magnesium, Total	**mg/L**	**Report**	**--**	**--**	**Report**	**--**	**Effluent**	**1/quarter**	**Grab**

Parameter	Units	Effluent Limitations					Monitoring Requirements		
		Average Monthly	Average Weekly	Instantaneous Max	Maximum Daily	Maximum Weekly	Sample Location	Sample Frequency	Sample Type
Bromide	**mg/L**	**Report**	**--**	**--**	**Report**	**--**	**Effluent**	**1/quarter**	**Grab**
Fluoride	**mg/L**	**Report**	**--**	**--**	**Report**	**--**	**Effluent**	**1/quarter**	**Grab**
Nitrate-Nitrite (as N)	**mg/L**	**Report**	**--**	**--**	**Report**	**--**	**Effluent**	**1/quarter**	**Grab**

Notes
1. Loading (in lb/day) is calculated by multiplying the concentration (in mg/L) by the corresponding flow (in mgd) for the day of sampling and a conversion factor of 8.34. For more information on calculating, averaging, and reporting loads and concentrations see the *NPDES Self-Monitoring System User Guide* (EPA 833-B-85-100, March 1985).
2. The average monthly *E. coli* bacteria counts must not exceed a geometric mean of 126/100 ml based on a minimum of five samples taken every 3 - 7 days within a calendar month.
3. Reporting is required within 24 hours.
4. Maximum weekly maximum temperature which is the mean of daily instantaneous maximum temperatures measured over a consecutive 7 day period ending on the day of calculation.

Changes in effluent limits and monitoring requirements include the following:

- Ammonia - The discharge does not have a reasonable potential to violate the WQS for ammonia with allowance for a mixing zone in the reasonable potential calculation. Ammonia monitoring is continued in the draft permit, but the frequency is reduced to once per month.
- *E. coli* - The new permit limit for *E. coli* is consistent with the Lower Boise River TMDL and the Idaho WQS.
- BOD_5 limits are based on the effluent guidelines in 40 CFR 405.105 the Dry Milk Sub-Category.
- pH - The previous permit did not contain a pH effluent limit. The WQBELs for pH are applied based on the WQS applied at the point of discharge.
- The permit requires monitoring of iron, magnesium, bromide, fluoride and total nitrate-nitrite (as N) to determine if the Darigold discharge has a reasonable potential to cause, or contributes to an instream excursion above an applicable water quality standard during the next permit reissuance.
- Flow Limit - The flow limit is removed in the draft permit. This limit is unnecessary since: 1) the draft permit includes limits to meet effluent limit guidelines and water quality standards, and the facility has been in compliance with those limits; and 2) the permit includes mass-based limits to insure there is no dilution of the effluent.
- Temperature - Limits in the existing permit of 19 ºC maximum daily and 22 ºC instantaneous remain in the draft permit with more specific monitoring requirements. A new temperature limit of 13ºC for the period from November 1 through May 31 is added to protect salmonid spawning.
- Total phosphorus - The new permit limit for total phosphorus is consistent with the Lower Boise River TMDL.

- TSS – The draft permit includes revised TSS limits based on the revised TMDL.

A. Basis for Effluent Limits

In general, the CWA requires that the effluent limits for a particular pollutant be the more stringent of either technology-based limits (TBELs) or WQBELs. TBELs are set according to the level of treatment that is achievable using available technology. A WQBEL is designed to ensure that the WQS applicable to a waterbody are being met and may be more stringent than TBELs. The basis for the effluent limits proposed in the draft permit is provided in Appendix B.

B. Pollutants of Concern

The EPA identifies pollutants of concern in the discharge based on those which:

- Have a TBEL
- Have an assigned WLA from a TMDL
- Had an effluent limit in the previous permit
- Are present in the effluent monitoring. Monitoring data are reported in the application, DMR, and any special studies
- Are expected to be in the discharge based on the nature of the discharge

Pollutants of concern in Darigold's discharge are BOD_5, TSS, pH, ammonia, temperature, bromide, fluoride, nitrate-nitrite, total phosphorus, total iron, bromide, fluoride and total magnesium.

C. Technology-based Effluent Limitations

The federal regulation at 40 CFR 122.45(f) requires that effluent limits be expressed in terms of mass, if possible.

Darigold is subject to effluent limits outlined in 40 CFR 405 – Dairy Products Processing, Subcategory D (Butter) and Subcategory J (Dry Milk). However, Darigold does not discharge wastewater from its butter process; therefore, only effluent limits from Subcategory J, 40 CFR 405.105, were considered and include pH, BOD_5, and TSS

The TBELs applicable to the facility are summarized in Appendix B.

EPA must determine if the technology-based limits are stringent enough to protect ambient water quality. If they are not, EPA must develop more stringent water quality-based limits.

D. Water Quality-Based Effluent Limits

Statutory and Regulatory Basis

Section 301(b)(1)(C) of the CWA requires the development of limitations in permits necessary to meet water quality standards. Discharges to State or Tribal waters must also comply with limitations imposed by the State or Tribe as part of its certification of NPDES permits under section 401 of the CWA. The NPDES regulation 40 CFR 122.44(d)(1) implementing Section 301(b)(1)(C) of the CWA requires that permits include limits for all

pollutants or parameters which are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State or Tribal water quality standard, including narrative criteria for water quality. Effluent limits must also meet the applicable water quality requirements of affected States other than the State in which the discharge originates, which may include downstream States (40 CFR 122.4(d), 122.44(d)(4), see also CWA Section 401(a)(2)).

The regulations require the permitting authority to make this evaluation using procedures which account for existing controls on point and nonpoint sources of pollution, the variability of the pollutant in the effluent, species sensitivity (for toxicity), and where appropriate, dilution in the receiving water. The limits must be stringent enough to ensure that water quality standards are met, and must be consistent with any available wasteload allocation for the discharge in an approved TMDL. If there are no approved TMDLs that specify wasteload allocations for this discharge; all of the water quality-based effluent limits are calculated directly from the applicable water quality standards.

Reasonable Potential Analysis and Need for Water Quality-Based Effluent Limits

The EPA uses the process described in the *Technical Support Document for Water Quality-based Toxics Control* (*TSD*) to determine reasonable potential. The EPA compares the maximum projected receiving water concentration to the water quality criteria for that pollutant to determine if there is reasonable potential for the discharge to cause or contribute to an exceedance of water quality criteria for a given pollutant,. If the projected receiving water concentration exceeds the criteria, there is reasonable potential, and a water quality-based effluent limit must be included in the permit.

In some cases, a dilution allowance or mixing zone is permitted. A mixing zone is a limited area or volume of water where initial dilution of a discharge takes place and within which certain water quality criteria may be exceeded (EPA, 2014). While the criteria may be exceeded within the mixing zone, the use and size of the mixing zone must be limited such that the waterbody as a whole will not be impaired, all designated uses are maintained and acutely toxic conditions are prevented.

The Idaho Water Quality Standards at IDAPA 58.01.02.060 provides Idaho's mixing zone policy for point source discharges. In the State 401 Certification, the IDEQ proposes to authorize mixing zones. The proposed minimum mixing zones for ammonia is 10% of the river flow. All dilution factors are calculated with the effluent flow rate set equal to the design flow of 0.38 mgd.

See Appendix D for the RPA that uses these mixing zones.

Reasonable Potential and Water Quality-Based Effluent Limits

The reasonable potential and WQBELs for specific parameters are summarized below. The calculations are provided in Appendix C.

<u>Ammonia</u>

Ammonia criteria are based on a formula that relies on the pH and temperature of the receiving water because the fraction of ammonia present as the toxic, unionized form increases with increasing pH and temperature. Therefore, the criteria become more stringent

as pH and temperature increase. The table below details the equations used to determine water quality criteria for ammonia.

Acute Criteria Equation: Cold Water

$$CMC = \frac{0.275}{1 + 10^{7.204 - pH}} + \frac{39.0}{1 + 10^{pH - 7.204}}$$

Acute Criteria Equation: Warm Water

$$CMC = \frac{0.411}{1 + 10^{7.204 - pH}} + \frac{58.4}{1 + 10^{pH - 7.204}}$$

Chronic Criteria: Cold Water, Early Life Stages Present

$$CCC = \left(\frac{0.0577}{1+10^{7.688-pH}} + \frac{2.487}{1+10^{pH-7.688}}\right) \bullet MIN(2.85, 1.45 \cdot 10^{0.028(25-T)})$$

Chronic Criteria: Cold Water, Early Life Stages Absent

$$CCC = \left(\frac{0.0577}{1+10^{7.688-pH}} + \frac{2.487}{1+10^{pH-7.688}}\right) \bullet 1.45 \cdot 10^{0.028(25-T)})$$

A reasonable potential analysis (RPA) showed that Darigold's discharge would not have the reasonable potential to cause or contribute to a violation of the WQC for ammonia**.** Therefore, the draft permit does not contain a WQBEL for ammonia. See Appendix C and D for reasonable potential for ammonia.

Temperature

The segment of the Boise River to which the facility discharges is protected for cold water aquatic life and salmonid spawning. This segment is listed in Idaho's 2014 Integrated Report for not achieving the water quality standards for temperature (ID17050114SW005_06b Boise River-Middleton to Indian Creek 7.88 MILES) for both cold water aquatic life and salmonid spawning. IDEQ has not developed a temperature TMDL to address the impairment in the Lower Boise River.

The criteria that apply for protection of cold water aquatic life are:

> Water temperatures of twenty-two (22) °C or less with a maximum daily average of no greater than nineteen (19) °C (IDAPA 58.01.02.250.02.b).

IDAPA 58.01.02.278.04 outlines site-specific criteria for water temperature of the Boise River – River Mile 50 to Indian Creek segment for salmonid spawning:

> "Boise River, SW-5 and SW-11a -- Site-Specific Criteria for Water Temperature. A maximum weekly maximum temperature of thirteen degrees C (13ºC) to protect brown trout, mountain whitefish, and rainbow trout spawning and incubation applies from November 1 through May 30."

These site-specific criteria were approved by the EPA in a letter dated October 27, 2011.

Darigold has reasonable potential to exceed the temperature water quality criteria. The existing permit has limits based on meeting the temperature criteria for cold water quality life at the end of pipe. These limits are retained in the draft permit. In addition, the draft permit includes more stringent end of pipe limits from November 1 through May 31 when the site specific salmonid spawning criteria apply. Currently, to achieve compliance with the temperature limits in the existing permit, Darigold discharges the non-contact cooling water to the City of Caldwell WWTP when the discharge does not meet the permit effluent limits. Since this method of achieving temperature limits remains available, a compliance schedule is not required to meet the more stringent temperature limits.

pH

The Idaho WQS (IDAPA 58.01.02.250.01.a) require surface waters of the State to have a pH value within the range of 6.5 - 9.0 standard units. The limits are 6.5 and 9.0 standard units.

TSS

The TSS and *E. Coli* Addendum, Table 15, provides a TSS reserve for growth allocation. In a letter dated September 7, 2017 IDEQ stated that IDEQ is revising the TSS and *E. Coli* Addendum Table 15 to provide Darigold "100 lbs/day and 143 lbs/day for the monthly average and weekly average limits, respectively."

Technology-based limits based on the ELGs apply to the discharge, see Appendix B. The TBELs and the WQBELs are compared in the table below. The proposed WQBELs from IDEQ are more stringent than the calculated TBELs. Therefore, the WQBELs are selected as effluent limitations for TSS.

Comparison of Technology-Based and Water Quality-Based TSS Load Limit (lb/day)

	Average Monthly	Average Weekly	Maximum Daily
TBELs	681.1	--	1362.0
WQBELs	100	143	--
Most Stringent Limit	100	143	--

The existing permit has a water quality-based average monthly TSS concentration limit of 30 mg/L. The existing discharge meets this concentration limit. Therefore, the EPA is retaining the limit in the draft permit.

E. coli

The Idaho water quality standards state that waters of the State of Idaho, that are designated for recreation, are not to contain *E. coli* bacteria in concentrations exceeding 126 organisms per 100 ml based on a minimum of five samples taken every three to seven days over a thirty-day period. This was also the WLA set forth in the 2015 Addendum. A mixing zone is not appropriate for bacteria for waters designated for contact recreation. Therefore, the draft permit contains a monthly geometric mean effluent limit for *E. coli* of 126 organisms per 100 ml (IDAPA 58.01.02.251.01.a.).

The Idaho water quality standards also state that a water sample that exceeds certain "single sample maximum" values indicates a likely exceedance of the geometric mean criterion, although it is not, in and of itself, a violation of water quality standards. For waters designated for primary contact recreation, the "single sample maximum" value is 406 organisms per 100 ml (IDAPA 58.01.02.251.01.b.ii.).

The goal of a water quality-based effluent limit is to ensure a low probability that water quality standards will be exceeded in the receiving water as a result of a discharge, while considering the variability of the pollutant in the effluent. Because a single sample value exceeding 406 organisms per 100 ml indicates a likely exceedance of the geometric mean criterion, the EPA has imposed an instantaneous (single grab sample) maximum effluent limit for *E. coli* of 406

organisms per 100 ml, in addition to a monthly geometric mean limit of 126 organisms per 100 ml, which directly implements the water quality criterion for *E. coli*. This will ensure that the discharge will have a low probability of exceeding water quality standards for *E. coli*.

Phosphorous

Darigold was allocated seasonal monthly WLAs of 1.4 lbs/day (May – September) and 5.0 lbs/day (October – April) in the Phosphorus Addendum. Therefore, the average monthly limit for total phosphorous is set equal to the TMDL WLA. Using procedures on page 103 of the TSD, the WLA is multiplied by a factor of 1.55. The average maximum daily limits are established at 2.2 lbs/day during the summer and 7.7 lbs/day during the winter.

Multiplier to Calculate Permit Limits from LTA

Number of Samples per Month (n)			4
Coefficient of Variation (CV) = Std. Dev./Mean			0.6
σ = std deviation	$\sigma^2=\ln(CV^2+1)$		0.555
Average Monthly Limit (AML),	$\exp(z\sigma_n-0.5z\sigma_n^2)$; where % probability basis =	95%	**1.55**

$$1.4\frac{lb}{day} \times 1.55 = 2.2\frac{lb}{day}$$

$$5.0\frac{lb}{day} \times 1.55 = 7.7\frac{lb}{day}$$

Bromide and Fluoride

To aide in the reasonable potential analysis for of bromide and fluoride to exceed the narrative water quality standards the permit requires an explanation of their presence in the discharge. The narrative water quality standard is IDAPA 58.01.02.200.02, Toxic Substances.

> "Surface waters of the state shall be free from toxic substances in concentrations that that impair designated beneficial uses."

Bromide and fluoride as toxic substances, have, in high enough concentrations, the reasonable potential to impair designated beneficial uses.

In addition to requiring quarterly effluent monitoring and ambient monitoring, the permit requires Darigold to provide an explanation for the presence of bromide and fluoride in the discharge.

E. Antibacksliding

Section 402(o) of the Clean Water Act and federal regulations at 40 CFR §122.44 (l) generally prohibit the renewal, reissuance or modification of an existing NPDES permit that contains effluent limits, permit conditions or standards that are less stringent than those established in the previous permit (i.e., anti-backsliding) but provides limited exceptions. For explanation of the antibacksliding exceptions refer to Chapter 7 of the Permit Writers Manual Final Effluent Limitations and Anti-backsliding.

The EPA has taken out the flow limit that was established in the expired 1978 permit. That flow limit was established to ensure that the facility could meet the temperature water quality standards that were applicable at that time. Since the 1978 permit was issued, IDEQ has

promulgated and EPA has approved new temperature water quality standards that are more stringent than the previous water quality standards. The EPA has established new temperature effluent limits based upon the current temperature water quality standards. These effluent limits are more stringent than the previous temperature limits. Moreover, given the new temperature effluent limits, there is no need to continue the flow limit. Since the flow limits was used to ensure the previously effective temperature water quality standards were met and since there are new temperature limits to ensure current water quality standards are met, removal of the flow limit does not constitute backsliding.

VI. Monitoring Requirements

A. Basis for Effluent Monitoring

Section 308 of the CWA and federal regulation 40 CFR 122.44(i) require monitoring in permits to determine compliance with effluent limitations. Monitoring may also be required to gather effluent and surface water data to determine if additional effluent limitations are required and/or to monitor effluent impacts on receiving water quality.

The permittee is responsible for conducting monitoring and reporting results on DMRs or on the application for renewal, as appropriate, to the EPA or IDEQ.

B. Effluent Monitoring

Monitoring frequencies are based on the nature and effect of the pollutant, as well as a determination of the minimum sampling necessary to adequately monitor the facility's performance. Permittees have the option of taking more frequent samples than are required under the permit. These samples must be used for averaging if they are conducted using the EPA-approved test methods (generally found in 40 CFR 136) or as specified in the permit.

The application reported detected levels and stated believed present the following pollutants:

- Iron, Total
- Magnesium, Total
- Nitrate-Nitrite (as N)
- Bromide
- Fluoride

These results are based on only one sample. Additional monitoring is required to characterize the discharge for these pollutants for an RPA in the next permit to determine whether the discharge violates WQS.

C. Surface Water Monitoring

Surface water monitoring may be required for pollutants of concern to assess the assimilative capacity of the receiving water for the pollutant. In addition, surface water monitoring may be required for pollutants for which the water quality criteria are dependent and to collect data for TMDL development if the facility discharges to an impaired water body. **Error! R eference source not found.**Table 7 presents the proposed surface water monitoring requirements for the draft permit. Surface water monitoring results must be submitted with the DMR.

Table 7 Surface Water Monitoring Requirements

Parameter	Units	Frequency	Sample Type
Conductivity[1]	umhos/cm	quarterly	grab
Dissolved Organic Carbon[1]	mg/L	quarterly	grab
Iron	µg/L	quarterly	grab
Magnesium	µg/L	quarterly	grab
Copper	µg/L	quarterly	grab
Bromide	µg/L	quarterly	grab
Fluoride	µg/L	quarterly	grab
Nitrate-Nitrite	mg/L	quarterly	grab

Notes:

1. Monitoring for conductivity and dissolved organic carbon is required to evaluate site-specific WQC for copper based on the biotic ligand model.

2. For quarterly monitoring frequency, quarters are defined as: January 1 to Mach 31; April 1 to June 30; July 1 to September 30; and, October 1 to December 31.

The permit includes new surface water quality monitoring requirements to evaluate the impact of the discharge with copper criteria. IDEQ intends to adopt new copper criteria that utilizes the Biotic Ligand Model (BLM). The BLM is a metal bioavailability model that uses receiving water body characteristics and monitoring data to develop site-specific water quality criteria. Input data for the BLM include: temperature, pH, dissolved organic carbon (DOC), major cations (Ca, Mg, Na, & K), major anions (SO4 & Cl), alkalinity, and sulfide. EPA's 2007 aquatic life freshwater quality criteria for copper is based on the BLM.

The BLM is most sensitive to DOC and pH. The remaining parameters may be estimated using conductivity measurements. The surface water data will be used to assess reasonable potential under the copper BLM criteria. Additional information may be found on the EPA website at http://water.epa.gov/scitech/swguidance/standards/criteria/aqlife/copper/.

D. Electronic Submission of Discharge Monitoring Reports

The draft permit requires that the permittee submit DMR data electronically using NetDMR. NetDMR is a national web-based tool that allows DMR data to be submitted electronically via a secure Internet application.

VII. Other Permit Conditions

A. Quality Assurance Plan

In order to ensure compliance with federal regulations at 40 CFR 122.41(e) for proper operation and maintenance, the draft permit requires the permittee to develop procedures to ensure that monitoring data submitted is accurate and to explain data anomalies if they occur. Darigold is required to update the Quality Assurance Plan (QAP) within 180 days of the effective date of the final permit. The QAP must include standard operating procedures the

permittee must follow for collecting, handling, storing and shipping samples, laboratory analysis, and data reporting. The plan must be retained on site and be made available to the EPA and the IDEQ upon request.

B. Best Management Practices Plan

The permit requires the Permittee to properly operate and maintain all facilities and systems of treatment and control. Proper operation and maintenance is essential to meeting discharge limits, monitoring requirements, and all other permit requirements at all times. The Permittee is required to develop and implement a Best Management Practices Plan for their facility within one year of the effective date of the final permit. The plan shall be retained on site and made available to EPA upon request.

C. Standard Permit Provisions

Sections III, IV, and V of the draft permit contain standard regulatory language that must be included in all NPDES permits. The standard regulatory language covers requirements such as monitoring, recording, and reporting requirements, compliance responsibilities, and other general requirements.

D. Environmental Justice

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, directs each federal agency to "make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities." EPA strives to enhance the ability of overburdened communities to participate fully and meaningfully in the permitting process for EPA-issued permits, including NPDES permits. "Overburdened" communities can include minority, low-income, tribal, and indigenous populations or communities that potentially experience disproportionate environmental harms and risks. As part of an agency-wide effort, EPA Region 10 will consider prioritizing enhanced public involvement opportunities for EPA-issued permits that may involve activities with significant public health or environmental impacts on already overburdened communities.

As part of the permit development process, EPA Region 10 conducted a screening analysis to determine whether this permit action could affect overburdened communities using a nationally consistent geospatial tool that contains demographic and environmental data for the United States at the Census block group level. This tool is used to identify permits for which enhanced outreach may be warranted.

Darigold is located within or near a census block group that is potentially overburdened.

In order to ensure that individuals who live near the facility are able to participate meaningfully in the permit process, EPA is conducting enhanced outreach activities. Specifically, the EPA has notified Spanish-language newspapers of the availability of this draft permit.

In addition, the EPA encourages permittees to review (and to consider adopting, where appropriate) "Promising Practices for Permit Applicants Seeking EPA-Issued Permits: Ways To Engage Neighboring Communities." Examples of promising practices include: thinking

ahead about community's characteristics and the effects of the permit on the community, engaging the right community leaders, providing progress or status reports, inviting members of the community for tours of the facility, providing informational materials translated into different languages, setting up a hotline for community members to voice concerns or request information, follow up, etc.

VIII. Other Legal Requirements

A. Endangered Species Act

The Endangered Species Act (ESA) requires federal agencies to consult with National Oceanic and Atmospheric Administration Fisheries (NOAA Fisheries) and the U.S. Fish and Wildlife Service (USFWS) if their actions could beneficially or adversely affect any threatened or endangered species. A review of the threatened and endangered species located in Idaho finds that there are no threatened or endangered species in the vicinity of Darigold's discharge. Therefore the issuance of this permit will have no effect on any threatened or endangered species, and consultation is not required for this action.

B. Essential Fish Habitat

Essential fish habitat (EFH) is the waters and substrate (sediments, etc.) necessary for fish to spawn, breed, feed, or grow to maturity. The Magnuson-Stevens Fishery Conservation and Management Act (January 21, 1999) requires the EPA to consult with NOAA Fisheries when a proposed discharge has the potential to adversely affect EFH (i.e., reduce quality and/or quantity of EFH).

The EFH regulations define an adverse effect as any impact which reduces quality and/or quantity of EFH and may include direct (e.g. contamination or physical disruption), indirect (e.g. loss of prey, reduction in species' fecundity), site specific, or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

The EPA has determined that issuance of this permit will have no effect on EFH. Neither the Boise River nor the Snake River within the Middle Snake-Payette (HUC 17050115) and Brownlee Reservoir (HUC 17050201) watersheds downstream from the Boise River are designated as EFH. The permit is conditioned to meet WQS in the Boise River. Thus, the discharge will have no effect on distant downstream reaches of the Snake River that are designated as EFH.

C. State Certification

Section 401 of the CWA requires the EPA to seek State certification before issuing a final permit. As a result of the certification, the State may require more stringent permit conditions or additional monitoring requirements to ensure that the permit complies with water quality standards, or treatment standards established pursuant to any State law or regulation. A copy of the draft 401 certification is provided in Appendix F.

D. Antidegradation

The IDEQ has completed an antidegradation review which is included in the draft 401 certification for this permit. (*See* Appendix E) The EPA has reviewed this antidegradation analysis and finds that it is consistent with the State's water quality standards and the State's

antidegradation implementation procedures. Comments on the 401 certification including the antidegradation review can be submitted to the IDEQ as set forth above (see State Certification on Page 1 of this Fact Sheet).

E. Permit Expiration

The permit will expire five years from the effective date.

IX. References

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EPA. 1991. *Technical Support Document for Water Quality-based Toxics Control*. US Environmental Protection Agency, Office of Water, EPA/505/2-90-001.

EPA. 2010. *NPDES Permit Writers' Manual*. Environmental Protection Agency, Office of Wastewater Management, EPA-833-K-10-001.

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Barry Burnell, Water Quality Division Administrator, Darigold – TSS Reserve for Growth Load Allocation for the Lower Boise River TMDL, September 7, 2017

Appendix A. Facility Information

General Information

NPDES ID Number:	ID0024953
Physical Location:	520 Albany Street, Caldwell, Idaho 83606
Mailing Address:	

Facility Information

Type of Facility:	Private industrial facility
Process Rate:	3.3 million lb/day raw milk
Facility Location:	43.66916667, - 116.68833333
Outfall Location:	43.677956, -116.697607

Receiving Water Information

Receiving Water:	Boise River
Subbasin:	Lower Boise (HUC 17050114)
Beneficial Uses:	Primary contact recreation, cold water aquatic life, salmonid spawning
Water Quality Limited Segment:	Yes

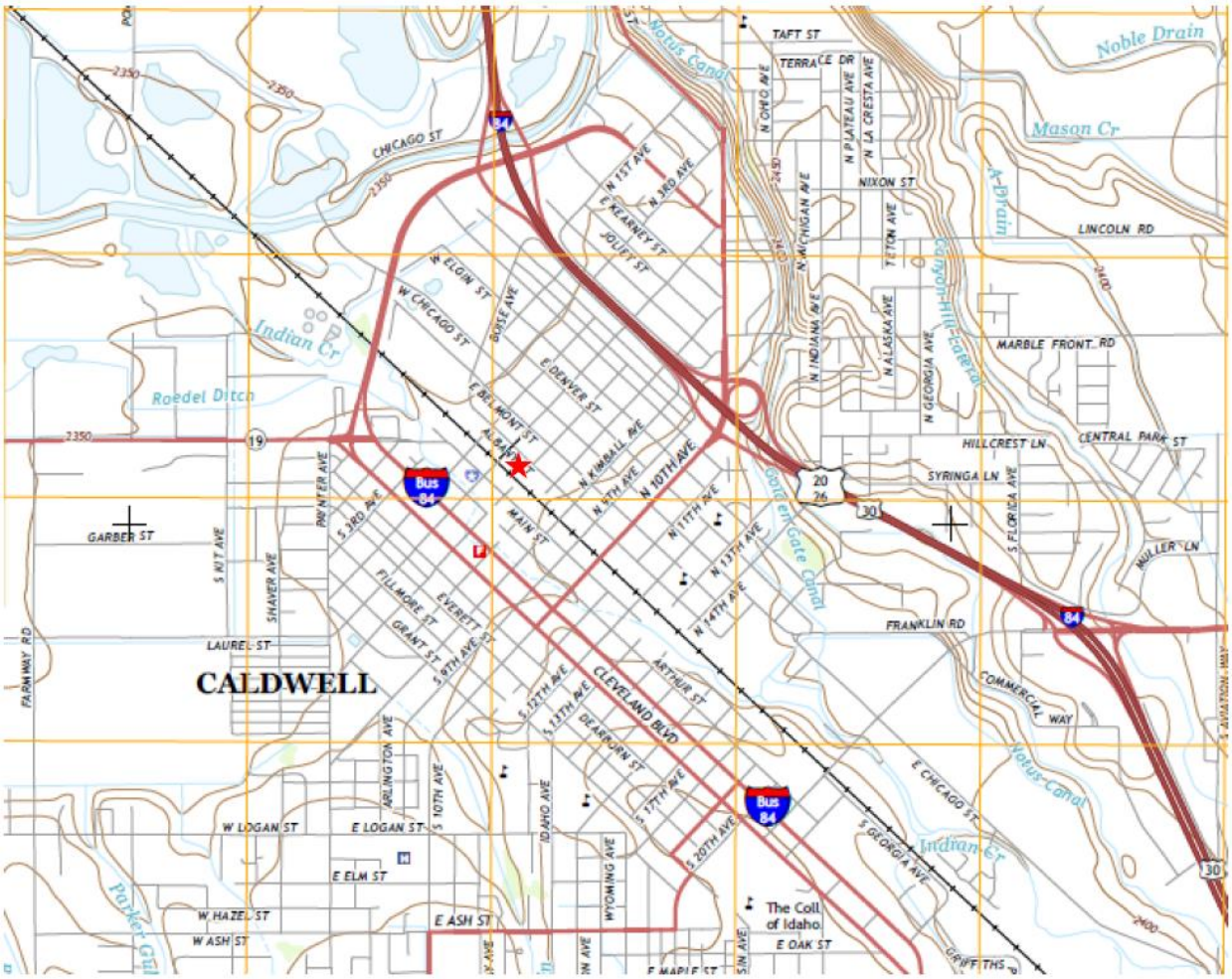

Figure 1. Facility Map

Appendix B. Basis for Effluent Limits

The following discussion explains the derivation of TBELs and WQBELs proposed in the draft permit.

A. Technology-Based Effluent Limits

Industrial Point Source Effluent Limits

Darigold is subject to effluent limits outlined in 40 CFR 405 – Dairy Products Processing, Subcategory D (Butter) and Subcategory J (Dry Milk). However, Darigold does not discharge wastewater from its butter process; therefore, only effluent limits from Subcategory J, 40 CFR 405.102, were considered and include pH, BOD_5, and TSS.

BOD_5

Darigold's milk drying process is subject to effluent limit guidelines (ELGs) in 40 CFR 405 Subpart J Dry Milk, which uses BOD_5 input to calculate BOD_5 and TSS. Darigold processes 3.3 million pounds of milk per day.

3.5 percent fat (butterfat)

3.2 percent protein

4.75 percent lactose (carbohydrates)

To calculate the BOD_5 input, the total pounds of fat, protein, and carbohydrates contained in Darigold's 3.3 million lb/day raw milk must first be calculated. Percent composition of fat, protein, and carbohydrates in Darigold's raw milk was confirmed by Scott Algate (Darigold).

$$Raw\ milk\ \left(\frac{lb}{day}\right) \times\ Percent\ Fat, Protein, or\ Carbohydrates$$

Total Fat

$$3{,}300{,}000 \frac{lb}{day} \times\ 0.035 = 115{,}500\ lb\ fat$$

Total Protein

$$3{,}300{,}000 \frac{lb}{day} \times\ 0.032 = 105{,}600\ lb\ protein$$

Total Carbohydrates

$$3{,}300{,}000 \frac{lb}{day} \times\ 0.048 = 158{,}000\ lb\ carbohydrates$$

BOD_5 Input

BOD_5 input is calculated multiplying the fats, proteins and carbohydrates input materials by factors of 0.890, 1.031 and 0.691 respectively.

$$115{,}500\ lb\ fat\ \times\ 0.890 = 102{,}800\ BOD_5\ input\ from\ fat$$

$$105{,}600\ lb\ protein\ \times 1.031\ = 108{,}900\ BOD_5\ input\ from\ protein$$

$$158{,}000\ lb\ carbohydrates\ \times 0.691\ = 109{,}000\ BOD_5\ input\ from\ carbohydrates$$

$$Total\ BOD_5\ input = 302{,}700\ lb/day$$

BOD_5 Effluent Limit

The facility is considered a new source in accordance with the definition at 40 CFR 122.2 and with the criteria for new source determination at 40 CFR 122.29 (b). Therefore, the performance standards outlined in 40 CFR 405.105 are applicable to Darigold. The BOD_5 average monthly limit (AML) and maximum daily limit (MDL) calculations below use the performance standards outlined in Table 8.

Table 8. Performance Standards for New Sources (40 CFR 405.105)

Technology-Based Effluent Limitations Guideline (40 CFR 405.105) Dry Milk Standards of Performance for New Sources		
Parameter	Maximum Daily Limit	Average Monthly Limit
	lb/100 lb of BOD_5 input	
BOD_5	0.036	0.018
TSS	0.450	0.225
pH	6.0 to 9.0 s.u.	

$$AML = Total\ BOD_5\ input\ per\ day\ \times AML\ Performance\ Standard$$
$$AML = (302{,}700\ lb\ BOD_5\ input\ per\ day) \times \left(\frac{0.018}{100\ lb\ BOD_5\ input}\right)$$
$$AML = 54.49\ lb$$

$$MDL = Total\ BOD_5\ input\ per\ day\ \times MDL\ Performance\ Standard$$
$$MDL = (302{,}700\ lb\ BOD_5\ input\ per\ day) \times \left(\frac{0.036}{100\ lb\ BOD_5\ input}\right)$$
$$MDL = 108.9\ lb$$

The exiting permit has a water quality-based average monthly BOD_5 concentration limit of 30 mg/L. The existing discharge meets this concentration limit. EPA is retaining the limit in the draft permit to protect dissolved oxygen.

TSS

A TSS limit is calculated using the total BOD_5 input per day and the new source performance standards.

$$AML = (302{,}700\ lb\ BOD_5\ input\ per\ day) \times \left(\frac{0.225}{100\ lb\ BOD_5\ input}\right)$$

$$AML = 681.1\ lb$$

$$MDL = (302{,}700\ lb\ BOD_5\ input\ per\ day) \times \left(\frac{0.450}{100\ lb\ BOD_5\ input}\right)$$

$$MDL = 1362.0\ lb$$

Procedure for Deriving Water Quality-Based Effluent Limits

The first step in developing a water quality-based effluent limit is to develop a WLA for the pollutant. A WLA is the concentration or loading of a pollutant that the permittee may discharge without causing or contributing to an exceedance of WQS in the receiving water. WLAs are determined in one of the following ways:

1. TMDL-Based WLA

Where the receiving water quality does not meet WQS, the WLA is generally based on a TMDL developed by the State. A TMDL is a determination of the amount of a pollutant from point, non-point, and natural background sources that may be discharged to a water body without causing the water body to exceed the criterion for that pollutant. Any loading above this capacity risks violating WQSs. To ensure these waters will come into compliance with WQS Section 303(d) of the CWA requires States to develop TMDLs for those water bodies that will not meet WQS even after the imposition of technology-based effluent limitations. The first step in establishing a TMDL is to determine the assimilative capacity (the pollutant load that a water body can assimilate without exceeding WQS). The next step is to divide the assimilative capacity into allocations for non-point sources (LAs), point sources (WLAs), natural background loadings, and a margin of safety to account for any uncertainties. Permit limitations are then developed for point sources that are consistent with each point source's WLA.

2. Mixing zone based WLA

When the State authorizes a mixing zone for the discharge, the WLA is calculated by using a simple mass balance equation. The equation takes into account the available dilution provided by the mixing zone and the background concentrations of the pollutant.

Appendix C. Reasonable Potential and Water Quality-Based Effluent Limit Formulae

A. Reasonable Potential Analysis

The EPA uses the process described in the TSD to determine reasonable potential. To determine if there is reasonable potential for the discharge to cause or contribute to an exceedance of water quality criteria for a given pollutant, the EPA compares the maximum projected receiving water concentration to the WQC for that pollutant. If the projected receiving water concentration exceeds the criteria, there is reasonable potential, and a WQBEL must be included in the permit.

Mass Balance

For discharges to flowing water bodies, the maximum projected receiving water concentration is determined using the following mass balance equation:

$$C_d Q_d = C_e Q_e + C_u Q_u \qquad \text{Equation 1}$$

where,

- C_d = Receiving water concentration downstream of the effluent discharge (that is, the concentration at the edge of the mixing zone)
- C_e = Maximum projected effluent concentration
- C_u = 95th percentile measured receiving water upstream concentration
- Q_d = Receiving water flow rate downstream of the effluent discharge = Q_e+Q_u
- Q_e = Effluent flow rate (set equal to the design flow of the facility)
- Q_u = Receiving water low flow rate upstream of the discharge (1Q10, 7Q10 or 30B3)

When the mass balance equation is solved for C_d, it becomes:

$$C_d = \frac{C_e \times Q_e + C_u \times Q_u}{Q_e + Q_u} \qquad \text{Equation 2}$$

The above form of the equation is based on the assumption that the discharge is rapidly and completely mixed with 100% of the receiving stream.

If the mixing zone is based on less than complete mixing with the receiving water, the equation becomes:

$$C_d = \frac{C_e \times Q_e + C_u \times (Q_u \times \%MZ)}{Q_e + (Q_u \times \%MZ)} \qquad \text{Equation 3}$$

Where:

% MZ = the percentage of the receiving water flow available for mixing.

If a mixing zone is not allowed, dilution is not considered when projecting the receiving water concentration and,

$$C_d = C_e \qquad \text{Equation 4}$$

A dilution factor (D) can be introduced to describe the allowable mixing. Where the dilution factor is expressed as:

$$D = \frac{Q_e + Q_u \times \%MZ}{Q_e} \qquad \text{Equation 5}$$

After the dilution factor simplification, the mass balance equation becomes:

$$C_d = \frac{C_e - C_u}{D} + C_u \qquad \text{Equation 6}$$

If the criterion is expressed as dissolved metal, the effluent concentrations are measured in total recoverable metal and must be converted to dissolved metal as follows:

$$C_d = \frac{CF \times C_e - C_u}{D} + C_u \qquad \text{Equation 7}$$

Where C_e is expressed as total recoverable metal, C_u and C_d are expressed as dissolved metal, and CF is a conversion factor used to convert between dissolved and total recoverable metal.

The above equations for C_d are the forms of the mass balance equation which were used to determine reasonable potential and calculate wasteload allocations.

Maximum Projected Effluent Concentration

When determining the projected receiving water concentration downstream of the effluent discharge, the TSD recommends using the maximum projected effluent concentration (Ce) in the mass balance calculation (see equation 3, page C-5). To determine the maximum projected effluent concentration (Ce) the EPA has developed a statistical approach to better characterize the effects of effluent variability. The approach combines knowledge of effluent variability as estimated by a coefficient of variation (CV) with the uncertainty due to a limited number of data to project an estimated maximum concentration for the effluent. Once the CV for each pollutant parameter has been calculated, the reasonable potential multiplying factor (RPMF) used to derive the maximum projected effluent concentration (Ce) can be calculated using the following equations:

First, the percentile represented by the highest reported concentration is calculated.

$$p_n = (1 - \text{confidence level})^{1/n} \qquad \text{Equation 8}$$

where,

p_n = the percentile represented by the highest reported concentration
n = the number of samples
confidence level = 99% = 0.99

and

$$RPM = \frac{C_{99}}{C_{P_n}} = \frac{e^{Z_{99} \times \sigma - 0.5 \times \sigma^2}}{e^{Z_{P_n} \times \sigma - 0.5 \times \sigma^2}} \qquad \text{Equation 9}$$

Where,

σ^2 = $\ln(CV^2 + 1)$
Z_{99} = 2.326 (z-score for the 99th percentile)
Z_{P_n} = z-score for the P_n percentile (inverse of the normal cumulative distribution function at a given percentile)
CV = coefficient of variation (standard deviation ÷ mean)

The maximum projected effluent concentration is determined by simply multiplying the maximum observed effluent concentration (MOEC) by the RPMF:

$$C_e = (RPMF)(MOEC) \qquad \text{Equation 10}$$

Maximum Projected Effluent Concentration at the Edge of the Mixing Zone

Once the maximum projected effluent concentration is calculated, the maximum projected effluent concentration at the edge of the acute and chronic mixing zones is calculated using the mass balance equations presented previously.

Reasonable Potential

The discharge has reasonable potential to cause or contribute to an exceedance of WQC if the maximum projected concentration of the pollutant at the edge of the mixing zone exceeds the most stringent criterion for that pollutant.

B. WQBEL Calculations

Calculate the Wasteload Allocations (WLAs)

WLAs are calculated using the same mass-balance equations used to calculate the concentration of the pollutant at the edge of the mixing zone in the RPA. To calculate the wasteload allocations, C_d is set equal to the acute or chronic criterion and the equation is solved for C_e. The calculated C_e is the acute or chronic WLA. Equation 6 is rearranged to solve for the WLA, becoming:

$$C_e = WLA = D \times (C_d - C_u) + C_u \qquad \text{Equation 11}$$

The next step is to compute the "long term average" concentrations which will be protective of the WLAs. This is done using the following equations from the TSD:

$$LTA_a = WLA_a \times e^{(0.5\sigma^2 - z\,\sigma)} \qquad \text{Equation 13}$$

$$LTA_c = WLA_c \times e^{(0.5\sigma_4^2 - z\sigma_4)} \qquad \text{Equation 14}$$

where,

σ^2 = $\ln(CV^2 + 1)$
Z_{99} = 2.326 (z-score for the 99th percentile probability basis)
CV = coefficient of variation (standard deviation ÷ mean)
σ_4^2 = $\ln(CV^2/4 + 1)$

For ammonia, because the chronic criterion is based on a 30-day averaging period, the Chronic Long Term Average (LTA_c) is calculated as follows:

$$LTA_c = WLA_c \times e^{(0.5\sigma_{30}^2 - z\sigma_{30})} \qquad \text{Equation 15}$$

where,

σ_{30}^2 = $\ln(CV^2/30 + 1)$

The LTAs are compared and the more stringent is used to develop the daily maximum and monthly average permit limits.

Derive the maximum daily and average monthly effluent limits

Using the TSD equations, the MDL and AML effluent limits are calculated as follows:

$$\text{MDL} = \text{LTA} \times e^{(z_m\sigma - 0.5\sigma^2)} \qquad \text{Equation 16}$$

$$\text{AML} = \text{LTA} \times e^{(z_a\sigma_n - 0.5\sigma_n^2)} \qquad \text{Equation 17}$$

where σ, and σ² are defined as they are for the LTA equations above, and,

σ_n^2 = $\ln(CV^2/n + 1$

z_a = 1.645 (z-score for the 95th percentile probability basis)

z_m = 2.326 (z-score for the 99th percentile probability basis)

n = number of sampling events required per month. With the exception of ammonia, if the AML is based on the LTA_c, i.e., $LTA_{minimum} = LTA_c$), the value of ‘‘n’’ should is set at a minimum of 4. For ammonia, In the case of ammonia, if the AML is based on the LTA_c, i.e., $LTA_{minimum} = LTA_c$), the value of ‘‘n’’ should is set at a minimum of 30.

Appendix D. Reasonable Potential Determination

Ammonia

Reasonable Potential Analysis (RPA) and Water Quality Effluent Limit (WQBEL) Calculations

Facility Name	Darigold
Facility Flow (mgd)	0.38
Facility Flow (cfs)	0.59

Critical River Flows	(IDAPA 58.01.02 03. b)	Annual Crit. Flows	Seasonal Low Flow
Aquatic Life - Acute Criteria - Criterion Max. Concentration (CMC)	**1Q10**	128	
Aquatic Life - Chronic Criteria - Criterion Continuous Concentration (CCC)	**7Q10 or 4B3**	167	
Ammonia	**30B3/30Q10** (seasonal)	234	
Human Health - Non-Carcinogen	**30Q5**		
Human Health - carcinogen	**Harmonic Mean Flow**		

Receiving Water Data		Notes:	Annual Crit. Flows	Seasonal Low Flow
Hardness, as mg/L $CaCO_3$	*** Enter Hardness on WQ Criteria tab ***	5th % at critical flows		
Temperature, °C	Temperature, °C	95th percentile	20.95	
pH, S.U.	pH, S.U.	95th percentile	8.4	

Pollutants of Concern			**AMMONIA,** default: cold water, fish early life stages present	**AMMONIA,** default: cold water, fish early life stages present
Effluent Data	**Number of Samples in Data Set (n)**		21	
	Coefficient of Variation (CV) = Std. Dev./Mean (default CV = 0.6)		1.04	
	Effluent Concentration, µg/L (Max. or 95th Percentile) - (C_e)		8,590	
	Calculated 50th % Effluent Conc. (when n>10), Human Health Only			
Receiving Water Data	**90th Percentile Conc., µg/L - (C_u)**		80.00	
	Geometric Mean, µg/L, Human Health Criteria Only			
Applicable Water Quality Criteria	Aquatic Life Criteria, µg/L	Acute	2593.36	--
	Aquatic Life Criteria, µg/L	Chronic	852.01	--
	Human Health Water and Organism, µg/L		--	--
	Human Health, Organism Only, µg/L		--	--
	Metals Criteria Translator, decimal (or default use Conversion Factor)	Acute		
		Chronic		
	Carcinogen (Y/N), Human Health Criteria Only		--	--
Percent River Flow Default Value = **25%**	**Aquatic Life - Acute**	**1Q10**	25%	--
	Aquatic Life - Chronic	7Q10 or 4B3	--	--
	Ammonia	30B3 or 30Q10	25%	--
	Human Health - Non-Carcinogen	30Q5	--	--
	Human Health - carcinogen	Harmonic Mean	--	--
Calculated Dilution Factors (DF) (or enter Modeled DFs)	Aquatic Life - Acute	1Q10	55.4	--
	Aquatic Life - Chronic	7Q10 or 4B3	--	--
	Ammonia	30B3 or 30Q10	100.5	--
	Human Health - Non-Carcinogen	30Q5	--	--
	Human Health - carcinogen	Harmonic Mean	--	--

Aquatic Life Reasonable Potential Analysis

σ	$\sigma^2=\ln(CV^2+1)$		0.856	--
P_n	$=(1\text{-confidence level})^{1/n}$, where confidence level =	**99%**	0.803	--
Multiplier (TSD p. 57)	$=\exp(z\sigma-0.5\sigma^2)/\exp[\text{normsinv}(P_n)-0.5\sigma^2]$, where	**99%**	3.5	--
Statistically projected critical discharge concentration (C_e)			30337.69	--
Predicted max. conc.(ug/L) at Edge-of-Mixing Zone		Acute	625.83	--
(note: for metals, concentration as dissolved using conversion factor as translator)		Chronic	381.03	--
Reasonable Potential to exceed Aquatic Life Criteria			**NO**	**--**

Reasonable Potential Analysis (RPA) and Water Quality Effluent Limit (WQBEL) Calculations

Facility Name	Darigold
Facility Flow (mgd)	0.38
Facility Flow (cfs)	0.59

Critical River Flows	(IDAPA 58.01.02 03. b)	Annual Crit. Flows	Seasonal Low Flow
Aquatic Life - Acute Criteria - Criterion Max. Concentration (CMC)	**1Q10**	128	
Aquatic Life - Chronic Criteria - Criterion Continuous Concentration (CCC)	**7Q10 or 4B3**	167	
Ammonia	**30B3/30Q10** (seasonal)	234	
Human Health - Non-Carcinogen	**30Q5**		
Human Health - carcinogen	**Harmonic Mean Flow**		

Receiving Water Data		Notes:	Annual Crit. Flows	Seasonal Low Flow
Hardness, as mg/L $CaCO_3$	*** Enter Hardness on WQ Criteria tab ***	5th % at critical flows		
Temperature, °C	Temperature, °C	95th percentile	20.95	
pH, S.U.	pH, S.U.	95th percentile	8.4	

Pollutants of Concern			AMMONIA, default: cold water, fish early life stages present	AMMONIA, default: cold water, fish early life stages present
Effluent Data	**Number of Samples in Data Set (n)**		21	
	Coefficient of Variation (CV) = Std. Dev./Mean (default CV = 0.6)		1.04	
	Effluent Concentration, µg/L (Max. or 95th Percentile) - (C_e)		8,590	
	Calculated 50th % Effluent Conc. (when n>10), Human Health Only			
Receiving Water Data	**90th Percentile Conc., µg/L - (C_u)**		80.00	
	Geometric Mean, µg/L, Human Health Criteria Only			
Applicable Water Quality Criteria	Aquatic Life Criteria, µg/L	Acute	2593.36	--
	Aquatic Life Criteria, µg/L	Chronic	852.01	--
	Human Health Water and Organism, µg/L		--	--
	Human Health, Organism Only, µg/L		--	--
	Metals Criteria Translator, decimal (or default use Conversion Factor)	Acute		
		Chronic		
	Carcinogen (Y/N), Human Health Criteria Only		--	--
Percent River Flow Default Value = **10%**	**Aquatic Life - Acute**	**1Q10**	10%	--
	Aquatic Life - Chronic	7Q10 or 4B3	--	--
	Ammonia	30B3 or 30Q10	10%	--
	Human Health - Non-Carcinogen	30Q5	--	--
	Human Health - carcinogen	Harmonic Mean	--	--
Calculated Dilution Factors (DF) (or enter Modeled DFs)	Aquatic Life - Acute	1Q10	22.8	--
	Aquatic Life - Chronic	7Q10 or 4B3	--	--
	Ammonia	30B3 or 30Q10	40.8	--
	Human Health - Non-Carcinogen	30Q5	--	--
	Human Health - carcinogen	Harmonic Mean	--	--

Aquatic Life Reasonable Potential Analysis

σ	$\sigma^2=\ln(CV^2+1)$		0.856	--
P_n	$=(1\text{-confidence level})^{1/n}$, where confidence level =	**99%**	0.803	--
Multiplier (TSD p. 57)	$=\exp(z\sigma-0.5\sigma^2)/\exp[\text{normsinv}(P_n)-0.5\sigma^2]$, where	**99%**	3.5	--
Statistically projected critical discharge concentration (C_e)			30337.69	--
Predicted max. conc.(ug/L) at Edge-of-Mixing Zone		Acute	1408.61	--
(note: for metals, concentration as dissolved using conversion factor as translator)		Chronic	821.51	--
Reasonable Potential to exceed Aquatic Life Criteria			**NO**	**--**

Appendix E. Water Quality-Based Effluent Limit Calculations

Phosphorous

Darigold was allocated seasonal monthly WLAs of 1.4 lb/day (May – September) and 5.0 lb/day (October – April). The AML for total phosphorous is set equal to the TMDL WLA. Using procedures on page 103 of the TSD, the WLA is multiplied by a factor of 1.55. The average maximum daily limits are established at 2.2 lb/day during the summer and 7.7 lb/day during the winter.

Multiplier to Calculate Permit Limits from LTA

Number of Samples per Month (n)			**4**
Coefficient of Variation (CV) = Std. Dev./Mean			**0.6**
σ = std deviation	$\sigma^2=\ln(CV^2+1)$		0.555
Average Monthly Limit (AML),	$\exp(z\sigma_n-0.5z\sigma_n^2)$; where % probability basis =	**95%**	**1.55**

$$1.4\frac{lb}{day} \times 1.55 = 2.2\frac{lb}{day}$$

$$5.0\frac{lb}{day} \times 1.55 = 7.7\frac{lb}{day}$$

Comparison of Technology Based TSS Limit and Water Quality Based TSS Limit (lb/day)

	Monthly	
Technology Based Limit (ELG)	681.1	1362.0 (Maximum Daily)
Water Quality Based Limit (Allocation)	100	143 (weekly)
Most Stringent Limit	100	143

The proposed WQBELs from IDEQ are more stringent than the calculated TBELs. Therefore, the WQBELs are selected as effluent limitations for TSS.

pH

The Idaho WQS (IDAPA 58.01.02.250.01.a) require surface waters of the State to have a pH value within the range of 6.5 - 9.0 standard units. IDEQ will not authorize a mixing zone for the water quality-based criterion for pH. Therefore, this criterion must be met when the effluent is discharged to the receiving water. The TBELs for pH are 6.0 - 9.0 standard units. Mixing zones cannot be granted for TBELs. To ensure that both water quality-based requirements and technology-based requirements are met, the draft permit incorporates the more stringent lower limit of the water quality standards of 6.5 standard units. The upper limit of the surface water standard and the technology-based limit are both 9.0 standard units and is established as the upper pH limit.

Appendix F: 401 State Certification

To be inserted later